Evaluating the Weekly-Assessed Tutorial Sheet approach to assessment: the students' experience

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Summary
Evaluations of teaching and assessment interventions often focus on pre- and post-intervention changes in examination and/or coursework performance. Whilst these are important indicators in their own right, it is interesting also to review the student view of the intervention. This paper adds a further perspective to the examination performance improvements resulting from the introduction of Weekly-Assessed Tutorial Sheets (see Russell, 2005) by focusing on the voice of the student.

In the case presented here, changing the assessment strategy not only improved the examination performance but also gave rise to improvements in Student Feedback Questionnaire (SFQ) returns as well as other positive observations about the experience. What is particularly interesting from the feedback is the fact that the students recognised the value of the assessment, wanted to see the approach transported to other modules and yet many were reluctant to commit to doing the work unless it counted towards their grade for the module.

Introduction

Fluid Mechanics and Thermodynamics are core subjects within most branches of Engineering. Fluid Mechanics deals with the macroscopic behaviours of fluids, fluid flow and their interaction with their surroundings, whereas Thermodynamics deals with energy flows and the transfer of energy through its different forms.

Although the subjects are often reliant on some mathematical competency, both are highly relevant to the real world. They allow us, *inter alia,* to understand why aircraft fly and cars do not; to optimise the design of cars for fuel efficiency; and also inform the debate on green engineering and sustainability. This suggests that opportunities for relevant, authentic and exciting studies are numerous.

Coupling the above with the perceived interests of many engineering students it is disappointing that less than half (49%) the students registered on a first-year combined Fluid Mechanics and Thermodynamics module scored more than 35% in the final examination (2001/02). These figures arose in spite of the variety of learning experiences through lectures, small group tutorials, laboratory sessions as well as active use of StudyNet. In some senses this module was doing everything right.

Given the influence of assessment on student learning and their study behaviours (Biggs, 2003 & Ramsden, 1992), it will be no surprise that the analysis of the poor examination performance focused attention on the in-module assessment. In 2001/02 the in-module assessment consisted of a one-off phase test and two laboratory reports. For 2002/03, the in-module phase test was replaced with a continuous assessment programme. During that year, the percentage of students scoring above 35% increased to 67%, this increased figure being maintained for subsequent years. This data suggests that the modified assessment had a real and positive impact. Further details on the background to the modified assessment, the influence of the appropriate pedagogy and its impact on student performance is reported elsewhere (Russell, 2005). This paper does not focus on those aspects but provides an insight into the students' behaviours whilst undertaking the new assessment and also shares their views on the experience. To provide a context for the student view, a brief overview of the new assessment is given.

WATS approach to assessment – a brief overview

The modified assessment was developed to overcome the unacceptable examination performance. It sought to ensure that, through summative assessment, the students engaged with the subject outside the lecture theatre. This was achieved by delivering, through StudyNet*,* a student-unique Weekly-Assessed Tutorial Sheet (WATS). Each WATS presented a few typical homework-type questions requiring around one to two hours of student effort.

Having only one week to undertake each task meant that the students were required to think about the lecture/tutorial not long after they had attended it. No longer could they close their books or minds until next week's lecture. In effect, it forced some consolidation of that week's material. To maximise the learning potential, the students were provided with individualised feedback a few hours after the midnight submission deadline. This weekly cycle of *task setting, student engagement,* and *prompt feedback* as well as *early diagnoses of mis-understandings* was repeated eleven times in the course of the semester. The nature of this assessment (i.e. individualised weekly tasks supported by immediate feedback) necessitates some reliance on computer tools, both off-the-shelf and bespoke.

Time of submission

One of the benefits of e-learning is the flexibility it provides to the learner (Jenkins & Hanson, 2003). Structured e-learning allows the students to engage with their studies at a time and in a place that best suits them.

Whilst computer-assisted assessment (CAA)/e-assessment (i.e. one important component of e-learning) also allows such flexibility, many forms of e-assessment tie students to a computer. In these cases, the e-assessment does little to support many of the informal opportunities for learning. The WATS approach to assessment, however, although reliant on computers, does not tie students to computers; hence it readily supports this 'anytime, anyplace' opportunity. Students are free to discuss the work, in tutorial sessions, in the LRC, in the refectory or off-campus. In this e-assessment/e-learning experience, the students appear to have seized these opportunities. This is evidenced by a review of the timings of students' submissions to the *WATS Data Gatherer* – see figure 1. (The *WATS Data Gatherer* is a computer program written specifically to collect the students' submissions.)

Analysis of the submission 'time-stamps' shows that 698 out of the total 1,396 submissions (50%) were made outside typical office hours (09.00 – 17.00). Further, 250 of the submissions, ~17%, were made within two hours of the midnight submission deadline. Whilst this may demonstrate the study patterns of today's modern student and their willingness to work outside the lecture theatre, it is worrying how many of them still chose to submit their work so close to the submission deadline. It is worth noting that the nature of the WATS, i.e. a one-or

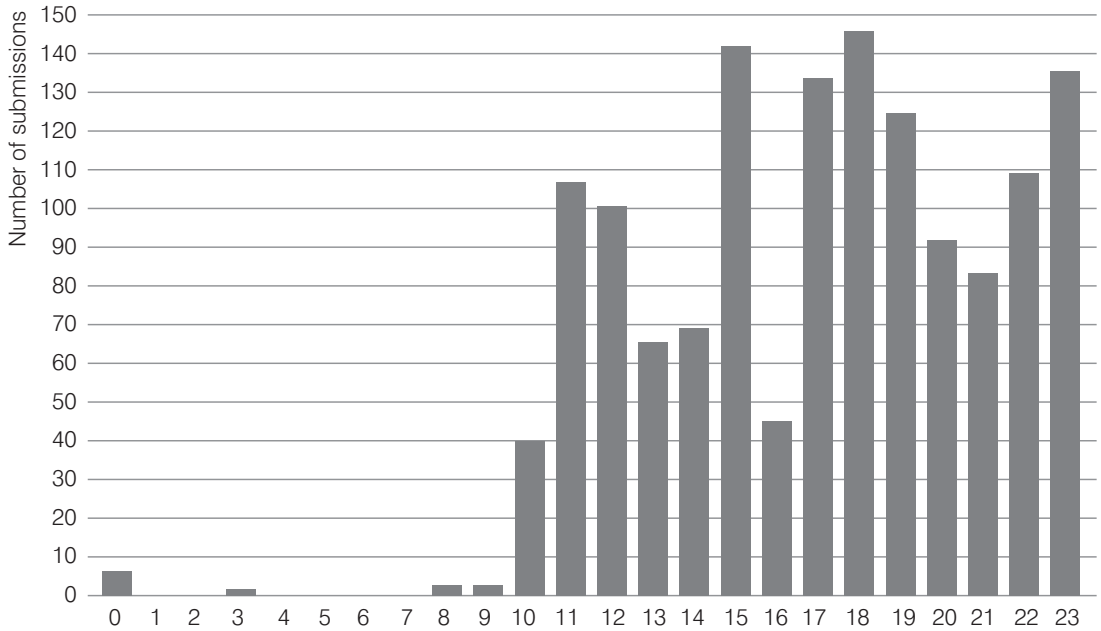


Figure 1. Timings of the students' submissions to the WATS Data Gatherer

two-hour problem, suggests that the students will not only be submitting their work, but most probably doing it, just before the deadline. This again is disappointing since it may perpetuate the idea that, no matter how long or short the coursework timescale, cramming may still work. It can also be shown from the submission 'date-stamps' that only 111 submissions out of a total of 1396, (~8%), were made one or more full days before the submission deadline. Such a trend is not unusual and is reported elsewhere (Bryan & Glasfurd-Brown, 2005).

Correlating the WATS score against the average difference in time between the students' actual submission time and the submission deadline gives a positive, but weak relationship R2 ~ 0.1. This positive correlation suggests that those students that submit their work earlier may do better (i.e. these are the more organised and effective students). The weakness of the correlation may be a consequence of the opportunities provided by the e-assessment facility and the fact that many students, with both good and bad scores, chose to submit their work so close to the submission deadline.

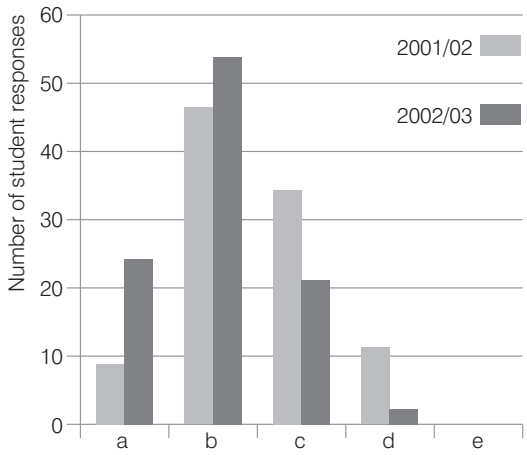
Student feedback

Feedback from the students was obtained from a variety of sources: the standard University of Hertfordshire Student Feedback Questionnaire (UH SFQ), from a WATS-specific questionnaire, and also from 'free text' opportunities provided in *StudyNet* and the *WATS Data Gatherer.*

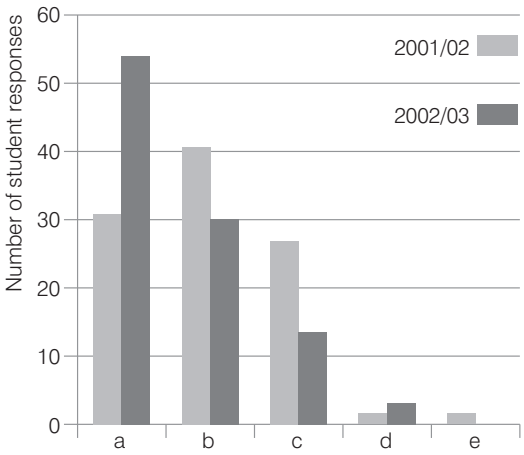
UH SFQ data

In the SFQ the students are asked to respond to a series of module-related questions using a five-point attitudinal scale where 'a' represents 'strongly agree' and 'e' represents 'strongly disagree'. The SFQ feedback for both 2001/02 (pre-WATS) and 2002/03 (post-WATS) is given for the three module-related questions in figure 2 a-c.

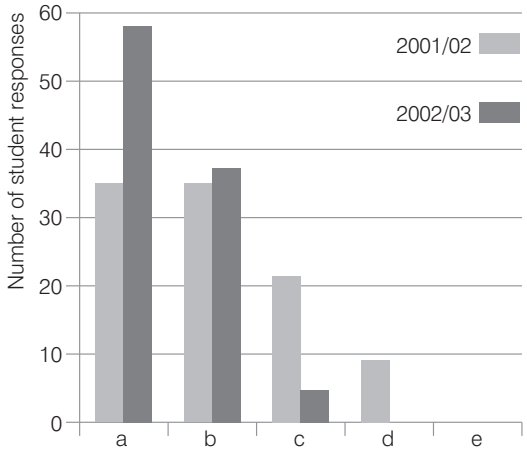
For each of the three questions there is an improvement in the 2002/03 (post-WATS) versus 2001/02 (pre-WATS) returns. Since the WATS were aligned with the learning outcomes it is not surprising that a better score arose in Q1. Further, in order to deliver a weekly, individualised task as well as provide prompt, personalised feedback with all the attendant group analyses, this aspect of the module had to be well organised. It was pleasing that the students acknowledged these efforts (Q2). What is most interesting is the students' response to Q3. There is clearly a marked difference between the student and staff view of independent learning. For whilst the students' rating for Q3 in 2002/03 is excellent, the most positive feedback for the three questions, it is worth restating that the WATS effectively forced the students to work outside of the lecture theatre. This, it is argued, is guided learning and hence difficult to classify



a) Q1 The module provided a learning experience which enabled the learning outcomes to be achieved.



b) Q2 The module was well organised.



c) Q3 Independent learning was encouraged.

Figure 2. UH module-specific SFQ results (2001/02 & 2002/03)

as independent learning! The overall analysis of responses to the three questions is shown in Table 1.

WATS-specific questionnaire

Feedback concentrating on the different features of the WATS assessment was gained from a dedicated WATS-specific questionnaire, used in 2002/03 and, in a revised form, in 2003/04. The questions together with the students' responses are given below.

2002/03 feedback

For 2002/03 a 15-question, paper-based questionnaire was delivered to the students at the end of the modules. This questionnaire sought the students' views using a six-point attitudinal scale and hence gave no opportunity for a neutral response (1 = strongly agree, 6 = strongly disagree). Although the sample size for this cohort was 131, only 84 of the students returned the questionnaire. This represents a response rate of ~64%. A summary of the student feedback is given in Table 2.

2003/04 feedback

To build on the experiences gained in 2002/03 a modified WATS-specific questionnaire was delivered in 2003/04, these modifications being the wording of the questions and the method of delivery. In 2003/04 the questionnaire was embedded into the *WATS Data Gatherer* which subsequently fed two questions, online, per week as the students submitted their answers. This modification gave rise to an improved questionnaire return rate of ~120/131 i.e. ~91%.

Other modifications included separating Q12 (2002/03) into two separate questions, *'like doing…'* and *'like getting a mark…',* as well as changing other questions to obtain more specific feedback on the evolving WATS assessment, i.e. the *league table* and the students' views on the *student-uniqueness* of the assessment. A weekly anonymised league table was used to feedback whole group performance and show the students' performance against their peers, the intention being to help stimulate an additional desire to do well.

Table1. Summary of the UH SFQ feedback for the module (2001/02 & 2002/03)

Module-related question	2001/02 (pre-WATS)	2002/03 (post-WATS)
Q1. The module provided a learning experience which enabled the learning outcomes to be achieved.	2.48	2.00
Q2. The module was well organised.	2.02	1.66
Q3. Independent learning was encouraged.	2.04	1.46

Note: Since the UH SFQ scores are bounded between 1.0 (best possible) and 5.0 (worst possible), a score lower than 3.0 (the neutral score) is a good score.

Table 2. Ranked-order summary of the students' responses to the WATS-specific questionnaire (2002/03)

No	Question	n	Score	% agree	% disagree
11	I believe the WATS will help me in the examination	83	2.08	95.18	4.82
9	I think other subjects could benefit from this teaching, learning and assessment approach	82	2.39	85.37	14.63
10	I really hope the WATS approach is followed through into other second- and final-year modules	83	2.60	81.93	18.07
15	Overall I would rate the WATS as excellent	83	2.70	84.34	15.66
7	The feedback I get from the WATS is really useful	84	2.82	72.62	27.38
12	I really like doing the WATS and getting a mark each week	83	3.35	59.04	40.96
13	I would still do the WATS even if they did not count towards the final grade for the module	82	3.59	45.12	54.88
6	Not allowing any lateness for the WATS is an excellent idea	84	3.63	52.38	47.62
14	I like the new electronic WATS submission facility	83	4.11	34.94	65.06
5	I would regard myself as someone who doesn't need deadlines to make me work	84	4.19	33.33	66.67
4	The WATS do not hinder my studies on other modules	84	4.57	15.48	84.52
	Average	83	3.28	59.97	40.03

Note: The % *agree* score shown in column three has been calculated by dividing the number of votes on the *agree* side of the attitudinal scale (1-3) by the total number of responses *(n)*. Whereas for the % *disagree* score (column 4), the number of votes on the *disagree* side of the attitudinal scale (4-6) is divided by the total number of responses *(n)*. Some questions were not used again in subsequent years and so are not included here.

During 2003/04 the students were also given an opportunity to give a neutral opinion by using a five-point attitudinal scale (1 = strongly agree, 5 = strongly disagree). A summary of this student feedback is given in Table 3.

Although the two questionnaires were not identical, some common and key messages emerge. The data for 2003/04 clearly shows the students liked the fact that the WATS were student-unique. Since, as mentioned earlier, this essentially reduces the potential for 'answer-sharing', this response may signal their willingness to disassociate themselves from collusion. This view is not uncommon and is repeated elsewhere (Ashworth et al, 1997).

In both years the students thought that the WATS assessment would help them in the examination (95% agreed in 2002/03 and 67% agreed in 2003/04). They thought that other subjects could benefit from this approach to assessment (85% 2002/03 & 62% 2003/04) and both liked the fact that it did not allow any lateness (73% 2002/03 & 62% 2003/04). Not allowing lateness was implemented to allow the students to gain prompt feedback, thus improving the learning experience.

The feedback for Q14 (2002/03) needs some context. During the early part of that year submission was by hand whereas towards the end of the year a data-collection facility was loaded onto one PC. The 2003/04 variant overcame this problem by installing the *WATS Data Gatherer* on the Learning Resources Centres (LRC) server. Access is now possible from any of the computers in either of the two UH LRCs – a marked improvement. Even with this improved access the 2003/04 feedback still shows that only 47% of the students trusted the new automated facility. Whilst this question attracts a good score, i.e. better than a neutral opinion, this result indicates that more than 50% of the students do not completely trust the automated collection and marking facilities. Whilst there are no known reasons for these concerns it may simply be that students do not want to engage with e-assessment and would prefer to have their work hand-marked by their tutor. Such observations have been confirmed verbally by a couple of students. This is worth further exploration and may be an issue for other staff wishing to adopt e-assessment as an integral part of the learning process.

Although the WATS were simply meant to be consolidatory homework-type problems incurring around one to two hours of student effort per week (outside of class), both year groups generally thought that this regular assessment hindered their ability to study other modules. It would be interesting to follow this line of enquiry further to establish how the students expend the 150 hours of effort required for each 15-credit-point module.

Perhaps the most concerning feature of the feedback is the fact that whilst the students acknowledged the likely benefits of this approach to assessment and wanted to see it transported to other modules, many indicated they would not undertake the work unless it featured as part of the summative process. Hence, if the facility was used more in the formative setting it is unlikely that many of the students would actively engage with it. Whilst there is much in the literature on the merits of formative assessment (e.g. Rushton, 2005) the feedback obtained here vindicates the summative aspect of the WATS.

Additional feedback

Opportunities to gather the student view outside of the SFQ and the WATS-specific questionnaire were provided in *StudyNet* and also within the *WATS Data Gatherer.* As the students submitted their answers to their penultimate WATS they were provided with an additional 'free-text' opportunity to express their thoughts on this assessment. In all, 83 students chose to give

Table 3. Ranked-order summary of the students' responses to the WATS-specific questionnaire (2003/04)

No	Question	n	Score	% agree	% neutral	% disagree
3	Having student-unique data is an excellent idea	123	2.15	62.60	28.46	8.94
6	I believe the WATS will help me in the examination	127	2.24	66.93	15.75	17.32
10	I really like getting a mark each week for my efforts	110	2.26	59.09	29.09	11.82
8	Having a weekly league table of student performance is an excellent idea	120	2.31	61.67	25.00	13.33
12	Not allowing any lateness for the WATS is an excellent idea	115	2.31	61.74	23.48	14.78
1	You only do well in the WATS if you understand the subject	133	2.32	63.91	21.05	15.04
13	Overall, I would rate the WATS as excellent	111	2.41	57.66	29.73	12.61
5	I think other subjects could benefit from this WATS approach	127	2.45	62.20	16.54	21.26
4	The fact that the WATS are weekly is an excellent idea	123	2.50	54.47	24.39	21.14
2	I completely trust these automated data-collection and marking facilities	133	2.62	46.62	33.08	20.30
11	The WATS do not hinder my studies on other modules	115	2.94	36.52	29.57	33.91
7	I would still do the WATS even if they did not count towards the final grade	120	2.97	36.67	31.67	31.67
9	I really like doing the WATS each week	110	3.28	29.09	23.64	47.27
	Average	120	2.52	53.78	25.49	20.72

Table 4. Summary of the student free-text response to the WATS assessment

	Generally positive	Generally negative	Generally neutral
Number of responses	50 (60%)	14 (17%)	19 (23%)

feedback. This feedback was carefully read and tagged to see if the comments were 'generally positive', 'generally negative' or 'neutral'. Although this tagging is inevitably subjective to some degree, it does allow the general trend to be identified - see Table 4.

The above feedback is particularly encouraging since the modus operandi for student feedback may be for them to look for issues rather than trying to tease out and identify successes.

Positive comments generally focused on the way the assessment provides a structured study routine, whereas the negative comments generally concerned the marking and issues associated with question-coupling (i.e. error carry-over). Others also thought the work was too regular and that it impacted too much on other modules. For completeness, the error carry-over relates to situations where an incorrect response to question 1 would not allow students to get question 2 correct, i.e. the questions were coupled. Whilst question-coupling allows the questions to build on each other it may create unfair marking situations. This has now been modified for current marking schemes.

Discussion and Conclusion

It is apparent that assessment has a major impact on student activity and ultimately on learning. This work has shown that by replacing a 'one-off' form of assessment, i.e. an in-module phase test, with a series of weekly-assessed tutorial sheets a significant and positive impact on the students' examination performance and hence understanding of the subject can be gained.

The improvements arise because of the close alignment of this work with recognised principles of good practice in undergraduate education (Chickering & Gamson, 1987) and assessment (Gibbs & Simpson, 2003). Indeed many students commented that they saw this assessment regime as supporting their studies. One student observed, *'I think WATS was a good thing as it has made us all review our notes and revise throughout the semester instead of throwing them on the floor and not looking at them until the exam [sic]'.* This comment and others similar demonstrate that this work was achieving many of its objectives. It provided space in the curriculum for practice, it encouraged time on-task and also set high expectations; these in themselves are positive outcomes. In addition, the work also provided prompt and personalised feedback – the students were no longer waiting weeks to see how their performance had been judged. After the submission deadline had passed the feedback was essentially instantaneous - another feature of good assessment practice. This rapid feedback allowed the students to rethink their misunderstandings whilst the work was still fresh in their minds.

Generally, the feedback from the students is encouraging. They liked the fact that this assessment reduces opportunities for collusion, thanks to the student-unique nature of the WATS, and also that the assessment practice does not tolerate lateness. The

students gave a lukewarm response to the electronic feature of the assessment. It may be that these students need more time to trust such facilities or that, for high-stakes summative assessment, they want to be sure that it is marked by hand. The most worrying feature of the feedback is the duality of their response regarding usefulness and personal commitment. Many students recognised the importance of this work but countered this with a response that indicated they would not engage with it unless it was part of a summative assessment programme.

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Biographical notes

Mark Russell has been teaching at the University of Hertfordshire for ten years. His interests lie in engineering education and using a range of educational settings to both support and challenge his students. Mark was awarded the *Times Higher Education Supplement* / LTSN Generic Centre E-tutor of the Year in 2003, was one of the first five recipients of the Vice Chancellor's award for excellence in Teaching and Learning 2003/04 and more recently awarded a National Teaching Fellowship (2005).